



TITLE:

Study on High Speed Rotation

AUTHOR(S):

Arakatsu, Bunsaku; Katase, Akira; Kokame, Zyun;
Yano, Syukuro

CITATION:

Arakatsu, Bunsaku ...[et al]. Study on High Speed Rotation. 京都大学化学研究所報告 1950, 22: 67-67

ISSUE DATE:

1950-09-30

URL:

<http://hdl.handle.net/2433/74159>

RIGHT:

— Abstracts of Papers —

The following 40 abstracts are the first part out of 79 papers, read at the semi-annual meeting of the Institute on 10th and 11th June, 1950.

1. Study on High Speed Rotation.

*Bunsaku Arakatsu, Akira Katase, Zyun Kokame
and Syukuro Yano.*

To obtain high rotational speed and to study the whirling of its shaft, a number of small rods magnetically suspended in vacuum¹⁾ was driven by rotating magnetic field of the frequency of 176 kilo-cycles and up-to-date a speed of 28,600 r. p. s. was obtained with a rod of 0.298 cm in diameter and 1.50 cm in length. The acceleration of centrifugal force at periphery is estimated to be about 4.93 million times of gravity, while the peripheral speed is 269 m/sec.

The "magnetic bearing" device is of the same principle as was previously reported²⁾, except some improvements made on regulating circuit. Especially the battery was found to be effectively used as the plate supply for maintaining the operating condition for a long time. The number of rotation was measured by the photocell and cathod ray oscillograph.

For the prevention orbital motion of the rotor we arranged below it a small iron needle (0.1 cm in diameter, 1.6 cm in length) which was mounted on the top of small copper wire and dipped in the oil. In a few case the rotor was found to be stably accelerated up to high speed, but for that purpose, very careful geometrical arrangements of suspension coil, driving coils, damping needle, and equilibrium position of the rotor were required. In many cases we observed the rotor begin to precess at low speed. The occurrence of the precessional motion is prevented by arranging a piece of copper block just above the rotor according to the idea of L. E. MacHattie³⁾.

Another rotor of 0.298 cm in diameter and 2.277 cm in length was spun to a speed of 24,900 r. p. s. in a vacuum of 1.4×10^{-3} mmHg after one hour and 14 minutes acceleration, then the whirling occurred and the rotor bent double at the centre.

1) This bulletin. 21, 60 ('50)

2) ibid vol. 18, 92 ('49)

3) L. E. MacHattie; R. S. I. vol. 12, 429 ('41)